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Capturing Global Youth: Mobile Gaming in the U.S., Spain, and the Czech Republic

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Universidad Pública de Navarra, Spain Capturing Global Youth: Mobile Gaming in the U.S., Spain, and the Czech Republic

We adapt the technology acceptance model (TAM) to examine the factors influencing mobile gaming adoption among “global youth.” Our model replaces usefulness with convenience, incorporating visual appeal and escapism as antecedents of fun, and perceived novelty and economic value as antecedents of convenience. Questionnaire surveys were conducted in the U.S., Spain, and the Czech Republic, producing 432 usable responses. In the structural model assessment with the pooled sample, convenience exercises greater effects on attitude toward mobile games than fun, suggesting that the most important driver is probably the capability of being used flexibly at any time and in any place, rather than mere enjoyment. Tests of latent means suggest that most dimensions are perceived more strongly in the Czech Republic.

Keywords: Cross-country study, Experiential value, Global youth, Mobile games, Technology adoption

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Capturing Global Youth: Mobile Gaming in the U.S., Spain, and the Czech Republic

Mobile games have quickly opened up new dimensions for entertainment applications. According to Nokia (2006), in 2005 the mobile gaming market surpassed \$2.43 billion in worldwide revenues. Industry analysts project that this figure will reach nearly \$4.02 billion by 2006 and \$10.17 billion by 2010, with downloadable mobile gaming accounting for more than 30% of the total (M2 Presswire, 2006). Mobile

games are video games played on a mobile phone, smartphone, PDA, or handheld computer. There are three types: embedded games, SMS games, and browser games. Embedded games are hard-coded into the mobile handset's system and shipped with it. SMS games are played by sending text messages to a game server that processes them and sends the result back via SMS. Browser games are played using a mobile microbrowser, in either online or offline mode (Chauhan, 2006). Games that are downloaded to the mobile phone and played using a set of game technologies on the device are increasingly popular. Recent innovations in mobile games include single-player, multiplayer, and 3D graphics. Multiplayer games in particular are rapidly finding an audience, as developers take advantage of the ability to play against other people, in a natural extension of the mobile phone's connectivity (Chauhan, 2006). Recent industry surveys from China, Germany, India, Spain, Thailand, and the U.S. found that (1) mobile game players play mobile games frequently for an average of 28 minutes at a time; (2) users in the U.S. and Thailand indicated that they play for slightly longer periods; and (3) 80% of those surveyed indicated that they play mobile games at least once a week, and 34% play each day (Dobson, 2006).

By blending the virtual world and increased ubiquity, mobile games have rapidly become an attractive alternative to PC-based games, because they do not require advanced computing skills. The mobile device is subject to no constraints in time and space: consumers can play games whenever and wherever they wish. Sharp color screens and enhanced sound features appeal especially to the youth segment, and a significant percentage of teenagers spend much time in a small mobile "living" space.

Given this background, the present study attempts to explore mobile gaming adoption in multiple markets. Our objective is three-fold. First, we propose and test a model based on one of the most widely accepted theoretical frameworks in online consumer behavior: the technology acceptance model (TAM). TAM attempts to predict and explain system use with two primary determinants, perceived usefulness and perceived ease of use, that affect users' attitude, which in turn determines intention. TAM has been adopted and validated in numerous studies, including online gaming adoption (Ha, Yoon, and Choi, 2007; Hsu and Lu, 2004). Specifically, Ha et al. (2007) find that perceived ease of use, flow experience, perceived enjoyment, and perceived attractiveness are antecedents of attitudes, while perceived usefulness had no effect on attitude. A similar finding is reported by Hsu and Lu (2004) with regard to PC Internet games. However, no one has yet questioned whether perceived usefulness could be replaced by an alternative construct that could better explain gamers' attitude. In this light, the present study proposes perceived convenience in its place. Second, research on online gaming generally focuses on psychological motives, including personality, social interaction, and loyalty (Choi and Kim, 2004; Cole and Griffiths, 2007; Phillips, Butt, and Blaszczyński, 2006; Wan and Chiou, 2006). However, no study has explored experiential aspects of gamers' motivations. This study thus adopts the experiential value scale proposed by Mathwick, Malhotra, and Rigdon (2001), which has not to our knowledge been applied in the

context of new technology adoption. Third, we attempt to compare perceptual and attitudinal patterns in mobile gaming adoption in different cultures. To this end, we collected data from the U.S., Spain, and the Czech Republic. The U.S. and Spain represent the world's first and eighth largest economy, respectively, while the Czech Republic is one of the fastest growing states of the European Union (EU). These countries are distinct both culturally and linguistically, but relatively little is known about the extent to which they converge in the adoption of mobile phones in general and mobile entertainment in particular.

Adoption research for mobile gaming is currently important for three reasons. First, although marketers and advertisers have begun to recognize mobile games as a platform of branded fun, prior research on mobile commerce has seldom addressed this important question, with the important exception of Kleijnen, de Ruyter, and Wetzels (2004). However, the study by Kleijnen et al. (2004) is essentially a simulation analysis with potential gamers and thus does not really examine the motives and intentions of "real" mobile gaming adopters. Second, there is growing interest in the presence of "global teens" in international markets. It is argued that, despite a diversity of daily activities and lifestyles, young consumers share a common interest across cultures. This study attempts to address this "global youth" proposition by examining whether young consumers from different cultures exhibit similar mobile gaming adoption behavior. To our knowledge, this study is one of the few attempts of this kind. Third, understanding the antecedents of adoption of mobile games is particularly important for industry frontrunners, such as game designers, device developers, advertisers, and operators, among others. The findings of this study may help them to understand better major factors for making mobile games more acceptable and marketable.

In what follows, we first establish the necessary background on the mobile phone industry and global youth culture. Next, we review the relevant literature on the TAM and experiential value scale to formulate our research hypotheses and questions. We then explain the methodology in detail. After recognizing important limitations, we describe the results. In closing, we outline theoretical and managerial implications, while suggesting future research directions.

Literature review

Mobile industry across countries

Three countries chosen for this study—the U.S., Spain, and the Czech Republic—differ considerably not only in social, economic and geographic dimensions but also in key mobile indicators, conditions necessary to making testing of the hypotheses reasonable.

In 2007, the U.S. had 243 million mobile subscribers with an 81% penetration rate (CTIA-The Wireless Association, 2007), which fuels rapid growth in the mobile gaming market. According to Wireless World Forum (W2F), Japan's current

dominance in mobile gaming revenues will soon be eclipsed by the U.S. and China (ZGroup Mobile, 2006). According to Telephia, over 17 million Americans downloaded a mobile game during the last three months of 2006, representing an astonishing 45% jump from the 12 million recorded during the same time period in 2005 (Slocombe, 2007). This number is expected to reach 134 million game downloads every month by the year 2010. To our surprise, as many as 65% of U.S. mobile gamers are female (Slocombe, 2007).

In Spain, mobile phone penetration was 108% in 2007 (Telefónica, 2007). Its largest operator, Telefónica Móviles, offers mobile gaming content to MoviStar e-moción customers, who have access to Sega Mobile's wireless games, including Depth Charge and Sega Sports Mobile Golf, as well as Aiai's Funhouse (Sega, 2005). According to Nokia NGage, 77% of Spaniards subscribe to play games on their mobile at least once per week, with some 14% doing so at least once every day. 64% of mobile users in Spain play games on the move, a greater percentage than at the mere 50% who play at home. Multiplayer gaming is becoming more popular, with 17% currently accessing multiplayer games each week and averaging 28-minute sessions. An online mobile game site, Silicon Seeds, also claims that Spain is the second largest market in Europe for downloading mobile games (Collins, 2007).

In the Czech Republic, there were 12.56 million mobile phone subscribers in 2007. The penetration rate reaches 123%, which puts the Czech Republic in fourth place in the European Union (*TeleGeography*, 2007). Telefónica Móvil owns Telefónica O2 in the Czech Republic, which was created by the 2006 merger of fixed-line operator Český Telecom and its mobile phone unit Eurotel (Kozáková, 2006). In 2005, Czech users downloaded approximately 50,000 games per month and spent 1.4 million euros (SIBIS, 2003). The most frequent user segment is teenagers between the ages of 13 and 19. In an interesting parallel with the U.S., 65% of "regular" players are female.

Global Youth Culture

The implicit but important objective of this study is to capture global youth culture by validating the proposed model across the countries. If young consumers exhibit similar perceptions of the relevant dimensions of mobile gaming adoption, they provide indirect evidence that youth in different cultures share common interests and motivations in terms of mobile gaming.

In his seminal review of international advertising research, Taylor (2002) argues that the existence of the "global teen" segment is one of the most relevant topics that concern contemporary marketers and advertisers. However, there is a dearth of empirical effort in this area of research. So far, the notion of a youth market remains rather prototypical (see, e.g., Hassan and Katsanis, 1994), while various names, such as "Gen Y," "Baby Busters," and "MTV Generation" have been applied to this arguably homogeneous segment (Kjeldgaard, 2002). For example, Generation Y, also known by some as echo boomers or millennials, generally includes those children born between 1980 and 1995 (CBS News, 2007).

Christensen (2002) conducted a large-scale qualitative survey in Europe and finds that innovation and communication are two of the four primary factors that commonly attract the younger generation to brands across the continent. By combining these two factors, the mobile phone has become a key information technology for youth, because they expect interactions to be fun and spontaneous, while simultaneously private and personal (de Chenecey, 2002).

SMS-based text messaging has been used more frequently than e-mail, because it is fast, cheap, and ubiquitous (Byfield, 2002). For example, Cadbury, McDonald's, Emap, Xbox, and 20th Century Fox have all successfully used SMS as a marketing channel in targeting youth (de Kerckhove, 2002). This reflects the important observation that innovative wireless communication technology has made the mobile phone the most important possession for European, American, and Japanese teens (Arundhati, 2002). In 2005, 60% of those who played mobile games in the U.S. were teenagers between the ages of 13 and 17 (NPD Techworld, 2006).

Based on a study of 27,000 teens in 44 countries, Moses (2000) points out that global teens indeed make up a homogeneous market that includes music, fashion, film, video games, and technology. In this respect, the gaming industry has been attempting to generate new games that garner an almost global cult, following "Pokemon," "Rockstar Games," "Grand Theft Auto," and "Super Mario Sunshine" (Arundhati, 2002). Games represent an ideal industry, one in which marketers can target global youth in the same way as national youth—via television and the computer. Because the message is primarily electronic, advertising or promotion can be generated in New York, London, or Paris (Moses, 2000).

Across the world, the lives of late teens appear to be synchronized. Byfield (2002) conducted a qualitative study of boys and girls 16–19 years old in ten major cities (Tokyo, Shanghai, Hong Kong, Sydney, Milan, Berlin, Madrid, Paris, London, and Mexico City). She points out that history, economy, and culture fade into insignificance in the world of global branding. The same names appear in Tokyo and Mexico as in Sydney and Berlin. This is not surprising for established, famous global names like Nike, Sony, Pepsi, Coca Cola, and McDonald's, but nowadays many of the newer, less familiar international media, technology, and fashion brands appear (i.e., are advertised) simultaneously in many major cities of the world.

In comparison with earlier generations, today's youth are much less rebellious and politically engaged and are unlikely to desire ideological change in the world. Although they appear to remain ambivalent on such issues, they catch and spread new trends via the Internet, especially trends that the media supports (Byfield, 2002).

Clearly, there are more similarities than differences among the youth (Kjeldgaard and Askegaard, 2004; Moses, 2000), but some researchers point out that this is partially due to westernization: Asian teens hunger for Western culture via sophisticated information technology (Arundhati, 2002). Specifically, Internet and mobile communication technology appears to be a "nice-to-have" accessory among the cross-border youth segments. As yet, however, there are few empirical studies of the factors connecting youth and adoption of information technology.

Theoretical Framework

What are the determinants of mobile gaming adoption by global youth? To address this question, we ground our research framework in two theoretical models. First, the core attitudinal model is adapted from the technology acceptance model, which has received considerable attention in information technology adoption (Davis, 1989; Davis, Bagozzi, and Warshaw, 1989). Second, the antecedents of perceived fun and perceived convenience are based on the experiential values proposed by Mathwick et al. (2001).

Technology acceptance model (TAM)

The TAM stems from the theory of reasoned action, a model concerned with the determinants of consciously intended behaviors (Ajzen and Fishbein, 1980). The central idea underlying TAM is that a person's behavioral intention to use a "system" is determined primarily by two assessments: its usefulness and its ease of use. Perceived usefulness refers to the extent to which a prospective user believes that using a specific system will improve his or her job performance, while perceived ease of use refers to the extent to which a user expects the use of a specific system to be relatively free of effort (Davis, 1989). According to Radner and Rothschild (1975), effort is a finite resource that a person may allocate to the various activities for which he or she is responsible. Hence Davis (1989) proposes that, all else being equal, an application that is perceived to be easier to use than another is more likely to be accepted by users. Of primary interest for our purpose, a prior industry survey indicates that ease of use is among the top five factors in order of significance in determining the use of wireless handheld devices (Clarke, 2000).

The original TAM has received extensive empirical support through validations, applications, and replications across a diverse range of information technology, including the mobile device (Barnes and Huff, 2003; Bruner and Kumar, 2005; Lu, Yuk, Liu, and Yao, 2003; Luarn and Lin, 2005; Pagani, 2004; Whang and Chang, 2004; Wu and Wang, 2005). In prior research on gaming adoption, Hus and Lu (2004) added social influence and flow experience, which are conceptualized as antecedents of both attitude and intention. They found perceived ease of use to be the most important determinant of attitude, but perceived usefulness plays a minor role in this regard. In addition to flow experience, Ha et al. (2007) incorporated perceived enjoyment, perceived attractiveness, and perceived lower sacrifice as antecedents of attitude. Their findings show that the effect of perceived enjoyment is the most solid, while perceived usefulness has no impact on attitude formation.

Given these findings, this study proposes two important modifications of TAM. First, we propose to replace perceived usefulness with perceived convenience, which better captures the essence of mobile games' benefits. Second, we add experiential value dimensions that affect the core framework. Figure 1 shows our research model.

Experiential Value

Another theoretical basis of our research stems from mobile users' experiential gaming behavior. To address this issue, our study adapts the experiential value scale proposed by Mathwick et al. (2001). This experiential value is defined as “[a] perceived, relativistic preference for product attributes or service performances arising from interaction within a consumption setting that facilitates or blocks achievement of customer goals or purposes” (Mathwick et al., 2002, p. 53). Although the study by Mathwick et al. was based on the retail shopping environment, it offers useful insights to explain the value package that consumers expect to feel and enjoy in an online entertainment venue. Specifically, this addition of experiential value enables us to better understand both hedonic and utilitarian value components of mobile gaming behavior in a systematic manner.

The scale draws upon the typology suggested by Holbrook (1994) and is conceptualized as a multidimensional construct in the catalogue and Internet shopping environment. Here, the hedonic (intrinsic) and utilitarian (extrinsic) value components frame the experiential value (in which aesthetics, playfulness, customer return on investment and service excellence operate as second-order factors) that in turn intercorrelates with first-order factors: visual appeal, entertainment, escapism, enjoyment, convenience, and economic value.

In terms of online environments, this conceptualization of experiential value also appears to be theoretically consistent with Hoffman and Novak (1996), who make an important distinction between *goal-directed* and *experiential* behavior on Internet.

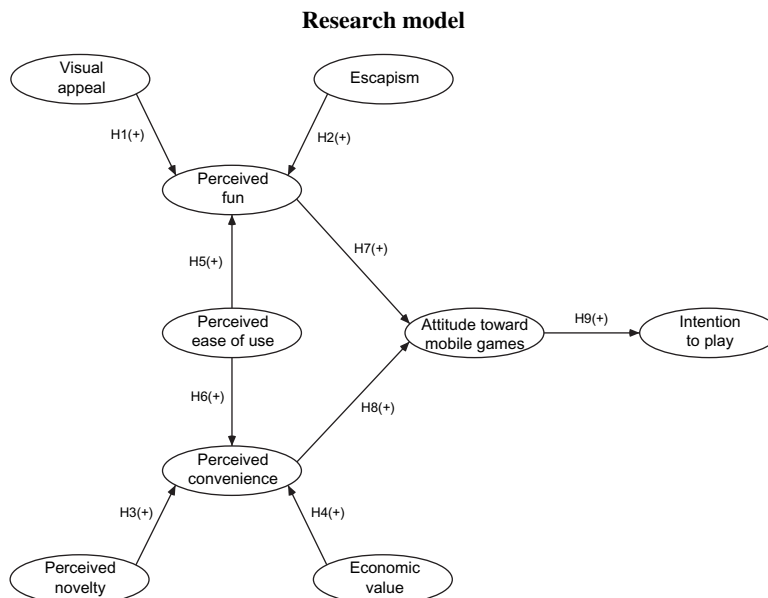


Figure 1 Research model.

In the same vein, Nysveen, Pedersen, and Thorbjørnsen (2005) classify mobile Internet services into two categories, goal-directed and experiential. These authors characterize mobile gaming as an experiential service. Their findings suggest that mobile gaming correlates strongly and positively with “enjoyment,” which represents the ritualistic orientation and hedonic benefit derived from the service. We argue that many mobile Internet adopters are likely to seek fun, fantasy, and/or a playful feeling rather than rational, immediate, material benefits.

Hypotheses and Research Questions

Perceived fun

The first dimension of our model, *perceived fun*, represents the level of the hedonic component of handheld mobile games. This dimension has also been found to be an important dimension in technology-based self-service (Dabholkar and Bagozzi, 2002), including m-commerce (Bruner and Kumar, 2005; Nysveen et al., 2005). Nysveen et al. (2005) find that enjoyment affects the use of experiential mobile services (i.e., contact and gaming) more strongly than the use of goal-oriented mobile services (i.e., SMS and payment). Perceived fun comes from engaging in activities that are absorbing, to the extent of offering an escape from the demands of the day-to-day world. This supports our thesis, in that users may engage in online mobile gaming if its use is intrinsically enjoyable. This is also consistent with the TAM, given that Davis, Bagozzi, and Warshaw (1992) found that perceived enjoyment has significant effects on the intention to use a word-processing program. This construct has been applied to the Internet context, in which a positive relationship has been postulated between perceived enjoyment and online service usage (Teo, Lim, and Lai, 1999). We postulate that two factors affect the levels of perceived fun in a mobile gaming context. For users, the first impression of visual appearance is a key prerequisite of the experiential value (Mathwick et al., 2001), which is also indulged in mobile gaming entertainment (Kleijnen et al., 2004). *Visual appeal* is driven by aesthetic design and physical attractiveness of an object. In examining the adoption of wireless Internet devices, Bruner and Kumar (2005) argue that performing online tasks is highly related to the use of mental imagery, because clicking icons and symbols is the principal method of processing information. Their argument is also consistent with Suh and Lee (2005), who found that consumer learning in computer-mediated virtual reality is dictated by visual or auditory modalities. This is especially relevant in a gaming context, where users are primarily interested in iconized objects and images in their information processing. In addition, prior research on the visual aesthetics of computer interfaces suggests that visual appeal is a strong determinant of pleasure experienced by the user during the interaction (Jordan, 1998).

Prior research finds that people tend to replay online games not only because of the perceived fun, but also because of the distorted notion of time and space involved, or social escapism (Nelson, 2005). Next, *escapism* can be defined as a “cause

to leave reality,” in which the users live, cognitively and emotionally, in unsatisfying life circumstances (Henning and Vorderer, 2001). Mathwick et al. (2001) measure escapism as one of the conditions necessary to transform online information search into “play.” Mobile users may use online services not only to satisfy objective needs, but also as a way of fulfilling fantasies or developing a desired “unreality.” That is, users may engage in online games to escape unpleasant realities and distract themselves from unhappy events. Furthermore, we predict that the effect of escapism on users’ intention to play online mobile games is accentuated by ubiquitous, universal, and uniform access to the service. Thus, we propose the following hypotheses:

H1: Visual appeals will directly and positively affect perceived fun in mobile games.

H2: Escapism will directly and positively affect perceived fun in mobile games.

Perceived convenience

In our model, the second dimension *perceived convenience* corresponds to but departs from perceived usefulness in the TAM. Dabholkar and Bagozzi (2002) argue that the dimension of usefulness is appropriate for products such as computer software but not relevant for technology-based self-service, in which the consumer participates but which he or she does not own. Instead, they suggest “performance,” which encompasses the reliability and accuracy of the service while also representing the “did its job” dimension developed by Meuter, Ostrom, Roundtree, and Bitner (2000), on the causes of consumer satisfaction related to technology-based self-service. By the same token, this study proposes *perceived convenience*. This term may be defined as agility, accessibility, and availability of a service, which is flexible in time and location. For handheld mobile gaming, what is relevant is neither reliability nor ownership but the “it fits my life” dimension, which addresses why the games must be played in this context. The mobile device is essentially a ubiquitous device and enables the consumer to be entertained at any time, in any place. At the same time, this dimension crystallizes the core utilitarian values of mobile games: simplicity in design, functionality in technology, and practicality in use. In this regard, two additional factors determine the levels of perceived convenience.

The first factor, *economic value*, represents the perceived affordability of online shopping, in that users can afford a reasonable amount of investment in time and money (Mathwick et al., 2001). This essentially captures the aspect of economic utility of mobile games, which derives from the evaluation of traditional cost-benefit evaluation of new technology adoption. In addition to the cost associated with a mobile Internet connection, downloading games from a mobile platform can be costly. Thus, users will necessarily expect this platform to provide a reasonable return on financial outlay (Mathwick et al., 2001).

The second factor, *perceived novelty*, can be defined as the degree to which an individual is receptive to new ideas and makes innovation decisions independently of the communicated experience of others. This construct is subject to the propensity of individuals’ behavior rather than to an innate personality trait (Midgley and

Dowling, 1978). In technology-based service adoption, consumers perceive novelty when searching for new stimuli or seeking arousal (Mehrabian and Russell, 1974), a quality similar to Rogers' (1995) "venturesomeness." In addition, Bruner and Kumar (2005) point out that the relative novelty and mobility of a handheld device provoke intrinsic motivation in consumers, thus giving them greater enjoyment and perceived fun. That is, upon discovering unfamiliar entertainment in a ubiquitous device, users are likely to enjoy playing a game. Thus, we postulate the following hypotheses:

H3: Economic value will directly and positively affect perceived convenience in mobile games.

H4: Perceived novelty will directly and positively affect perceived convenience in mobile games.

Perceived ease of use

The third dimension, *perceived ease of use*, refers to the extent to which an individual believes that the use of a mobile game will be free of effort (Venkatesh, 2000). In the original TAM, attitude toward using was conceptualized as completely mediating the effects of the dimensions of perceived ease of use and perceived usefulness and behavioral intention to use. However, in an application of TAM to handheld Internet adoption, Bruner and Kumar (2005) point out that the literature provides inconsistent results on how perceived ease of use influences attitude, in that the significance in the path connecting the former to the latter has been inconclusive. They hypothesize attitude to be "an overall evaluation, encompassing both utilitarian and hedonic components" (p. 554) and find that it completely mediated the effects of two antecedents, fun and usefulness, respectively. Perceived ease of use was found to have only an indirect effect on attitude. By the same token, this study posits that perceived ease of use has a direct effect on the perceived fun and perceived convenience dimensions but not on attitude. Therefore,

H5: Perceived ease of use will directly and positively affect perceived fun in mobile games.

H6: Perceived ease of use will directly and positively affect perceived convenience in mobile games.

Attitude Toward Mobile Games

Attitude is an affective response or "an index of the degree to which a person likes or dislikes an object" (Ajzen and Fishbein, 1980, p.28). Attitude is also regarded as a summary evaluation of both positive and negative sides regarding a given stimulus (Priester and Petty, 1996) and can be classified into two types: attitude toward the object and attitude toward the behavior (Fishbein and Ajzen, 1975). This study postulates that perceived fun and perceived convenience are primary determinants of attitude, which in turn mediates the effects of perceived fun and perceived convenience on intention to play. That is, attitude is the consequence of the perceived fun and perceived convenience that consumers experience in mobile games, while it is the antecedent of the intention to play mobile games. More formally,

H7: Perceived fun will directly and positively affect attitude toward mobile games.

H8: Perceived convenience will directly and positively affect attitude toward mobile games.

Lastly, attitudinal research suggests that attitudes will significantly, positively, and directly influence subsequent behavioral intention. This attitude-intention chain has been considered as fundamental in attitudinal research and has been supported in numerous different settings (Bagozzi, 1981; Dabholkar and Bagozzi, 2002; Shimp and Kavas, 1984; Bruner and Kumar, 2005). Thus:

H9: Attitude toward mobile games will directly and positively affect intention to play.

Cross-Country Convergence in the Levels of Perceptions

To address a question whether the perceived importance of mobile games converges across countries, this study posits that the strength of consumers' perceptions on the primary constructs of our model will be similar, regardless of the extent to which the mobile entertainment has penetrated a given country.

On one hand, the information published in trade journals indicates that mobile gaming adoption has been accelerating very rapidly in the U.S. due to technological advances. Worldwide mobile game revenue grew 56% to \$3.2 billion in 2006, of which the U.S. market accounts for almost 24% (3G Newsroom.com, 2006). By contrast, the European market for mobile games is expected to grow more than tenfold: from \$0.2 billion in 2002 to \$2.5 billion in 2008, representing approximately 19% of total revenue for mobile content and entertainment services (Polopudas, 2003). In Europe, Spain is one of the fastest growing countries, and its largest operator, *Telefónica Móvil*, also controls *Telefónica O2* in the Czech Republic (Bloomberg.com, 2006). On the other hand, in making a cross-country inference from the convergence of mobile game adoption, this study posits that young consumers' basic perceptions on and attitudes toward mobile gaming would be similar because of the presence of global youth culture. Thus, focusing on three primary dimensions of our attitudinal model, we set forth the following research questions to explore the descriptive aspects of the study thesis further:

RQ1: Is the basic causal structure of our research model equivalent across these countries?

RQ2: Is the strength of perceptions of the primary constructs of our model (i.e., perceived fun, perceived convenience, perceived ease of use, visual appeal, escapism, perceived novelty, economic value, attitude toward mobile games, and intention to play) similar across the countries?

The following section explains in detail the methodology of our empirical investigations.

Methodology

The data were collected by questionnaire surveys in the U.S., Spain and the Czech Republic. The sample consisted of university students of ages 18–25 in each country

who are primarily business majors between the second and fourth years. This age group stands for Generation Y, which composes the most active users of mobile services (Burns, 2005). Thus, our respondents formed a representative sample that suits our study objectives.

The questionnaire had two parts. In the first, we collected demographic data, such as gender, age, monthly allowance, monthly family income, mobile phone experience, and mobile game usage. In the second, we included question items regarding the constructs proposed in our research model. The majority of the scale items are adopted from the existing literature but adapted to the mobile gaming context. In addition, a qualitative pilot study with a circle of academics was performed to identify the attributes important to targeting customers. As a result, 46 question items were included in the final questionnaire (Appendix A). All questions were asked using a 7-point Likert scale, from 1 (completely disagree) to 7 (completely agree), with 4 as the anchoring point. The questionnaire was first prepared in English and later translated into the appropriate language by the translation-backtranslation method, to ensure cross-cultural equivalency (Craig and Douglas, 2000).

With prior permission from instructors, researchers went into classes and informed students that the researchers were conducting a preliminary study to establish young consumers' *general* perceptions of mobile games. No incentives were given for completing the questionnaires. All surveys were completed during Fall, 2006. After the students completed the survey, we carefully examined the questionnaires and removed the incomplete questionnaires, because missing data seriously distort the statistical analysis. We then also removed extreme outliers via box-plot analysis by eliminating those observations greater than 1.5 quartiles away from the end of the box (Hair, Anderson, Tatham, and Black, 1998). As a result, we obtained 105, 181, and 153 usable responses in the U.S., Spain, and the Czech Republic, respectively.

Table 1 summarizes the demographic information of the respondents in each country. The gender distribution differs considerably across countries. With the exception of Spain, males generally outweigh females. As the respondents consist of college students, the vast majority were between 18 and 25 years old. With regard to mobile usage experience, the respondents from the three countries exhibit a somewhat different background, in that the Czech sample contains the most experienced users, followed by the Spanish and U.S. samples in order of the years of use.

Results

Following the recommendations by Anderson and Gerbing (1988), we used a two-stage approach to data analysis, consisting of (1) the measurement model assessment, and (2) the structural model assessment.

Measurement Model Assessment

To evaluate the measurement model, we performed a confirmatory factor analysis (CFA) on the basis of the combined data from all three countries. AMOS 7.0 was

Table 1 Descriptive statistics of the respondents (%)

	U.S. (n = 105)	Spain (n = 181)	Czech Rep. (n = 153)
Demographics			
Gender			
Male	56.1	47.0	56.9
Female	43.9	53.0	43.1
Age			
< 20 years old	42.9	39.2	2.0
20 – 25 years old	56.1	59.7	96.1
> 25 years old	1.0	1.1	2.0
Years of mobile phone use			
< 1 years	8.2	3.3	.7
1 – 2 years	30.6	12.7	2.6
3 – 4 years	28.6	37.6	23.5
5 – 6 years	16.3	29.8	43.1
> 6 years	16.3	14.9	29.4

used with maximum likelihood method (Byrne, 2001). This procedure is appropriate for indicating the lowest level of reliability and validity of our measurement model. The CFA produced a significant chi-square value ($\chi^2_{337} = 654.01$, $p < 0.001$), probably due to a large sample size. However, in the light of the cut-off values recommended by the literature (Byrne, 2001; Hair et al., 1998), more pragmatic indices indicate an acceptable fit: comparative fit index (CFI) = 0.95, incremental fit index (IFI) = 0.95, root mean square error of approximation (RMSEA) = 0.047. On this basis, we calculated the composite reliability (CR) and average variance extracted (AVE) for each construct using the formulas suggested by Hair et al. (1998). As Table 2 shows, the scores are very high for all scales, far exceeding the minimum recommended 0.50 by Hair et al. (2006). In addition, in examining discriminant validity, we compared the square root of the AVE with the interfactor correlations (Table 3). None of the latter exceed the former, and we thus establish a high level of discriminant validity.

Next, we performed a simultaneous CFA to examine whether the scale intervals of the latent constructs are comparable across countries (Steenkamp and Baumgartner, 1998). Specifically, we assessed the measurement invariance by comparing nested complete measurement models in terms of the chi-square difference with the corresponding degree of freedom. This multigroup model fit the data well: $\chi^2_{1011} = 1568.01$ ($p < 0.001$), CFI = 0.91, IFI = 0.92, RMSEA = 0.036. The chi-square difference in the measurement weights is statistically insignificant across the three countries: $\chi^2_{40} = 49.70$, $p = 0.07$. On this basis, we consider it justified to pool the data from the three countries and to compare the focal paths hypothesized in our theoretical propositions.

Table 2 Reliability of the constructs examined

Constructs	No of items	Cronbach's alpha	Composite reliability	Average variance extracted
Perceived fun	3	0.74	0.74	0.50
Perceived convenience	3	0.64	0.81	0.59
Perceived ease of use	3	0.80	0.87	0.69
Visual appeal	4	0.77	0.87	0.63
Escapism	3	0.89	0.91	0.78
Perceived novelty	4	0.77	0.81	0.53
Economic value	3	0.80	0.79	0.56
Attitude toward mobile games	3	0.84	0.89	0.73
Intention to play	3	0.90	0.91	0.77

Structural Model Assessment

We performed structural equation modeling for the full sample, using maximum likelihood method via AMOS 7.0 (Byrne, 2001). Table 4 summarizes the parameter estimates, t-value, and goodness-of-fit indexes of the structural equation models. Again, according to the recommended cut-off values (Bryne, 2001; Hair et al., 2006), the model fits the data reasonably well: $\chi^2_{364} = 974.85$ ($p < 0.001$), CFI = 0.90, IFI = 0.90, RMSEA = 0.062.

Our H1 and 2 posit that the levels of visual appeals and escapism affect directly and positively the level of perceived ease of use. Both paths are found to be statistically significant. By the same token, as posited in H3 and H4, the paths from perceived novelty and economic value to perceived ease of use are found to be significant. Thus, H1 through H4 are supported by our data.

Table 3 Discriminant validity

	1	2	3	4	5	6	7	8	9
1. Perceived fun	0.70								
2. Perceived convenience	0.58	0.77							
3. Perceived ease of use	0.21	0.48	0.83						
4. Visual appeal	0.66	0.30	0.19	0.80					
5. Escapism	0.39	0.52	-0.04	-0.01	0.88				
6. Perceived novelty	0.38	0.57	0.21	0.22	0.37	0.73			
7. Economic value	0.15	0.43	0.29	0.03	0.12	0.39	0.75		
8. Attitude toward mobile games	0.55	0.64	0.46	0.35	0.31	0.69	0.33	0.85	
9. Intention to play	0.55	0.59	0.34	0.38	0.27	0.55	0.20	0.81	0.88

Note: Diagonal elements in bold are the square root of average variance extracted (AVE) between the constructs and their indicators.

Off-diagonal elements are correlations between the constructs.

In H5 and H6, we predict that perceived ease of use directly and positively influences perceived fun and perceived convenience. Although the strength of beta is modest, both the paths are statistically significant, thus providing support for H5 and H6.

H7 is related to the effects of perceived fun on attitude toward mobile games. This path generates a somewhat modest beta, which is statistically significant. Therefore, H7 is supported.

Similarly, H8 posits that the level of perceived convenience will directly and positively affect attitude toward mobile games. This path is not only significant but also very strong in terms of standardized beta. This rings true for H8.

Finally, H9 addresses whether attitude toward mobile games is a significant predictor of intention to play. This path is indeed significant and empirically supports H9. In addition, the effect is strong, indicating that the affective response is an important determinant of behavioral intention for mobile gamers.

Table 5 summarizes the results of individual estimation for each country. As is clearly seen, the model operates reasonably well across the countries, and the majority of the paths are statistically significant in all the countries. In addition, we conducted a multigroup analysis to find out whether the model operates invariantly across the samples. Here, in the baseline model, no constraints were added to the original model. Next, in the “equal path model,” one path was constrained to be equal. The difference in chi-square value was then calculated between the two models. If the chi-square value was statistically significant at $p < 0.05$, we determined that the strength of the path was not equal between the models: thus, the two models do not operate invariantly. However, none of the equal path models produced a significant chi-square value, leading us to conclude that our structural model operates invariantly across the cultures.

Table 4 Hypotheses testing

			Standardized Estimate	Standard error	<i>t</i> -value	<i>p</i>
H1	Visual appeal	→ Perceived fun	0.42	0.04	7.42	***
H2	Escapism	→ Perceived fun	0.19	0.06	3.55	***
H3	Perceived novelty	→ Perceived convenience	0.24	0.05	4.60	***
H4	Economic value	→ Perceived convenience	0.44	0.06	7.05	***
H5	Perceived ease of use	→ Perceived fun	0.24	0.04	4.59	***
H6	Perceived ease of use	→ Perceived convenience	0.82	0.06	9.36	***
H7	Perceived fun	→ Attitude toward mobile games	0.26	0.05	5.47	***
H8	Perceived convenience	→ Attitude toward mobile games	0.85	0.12	9.37	***
H9	Attitude toward mobile games	→ Intention to play	0.74	0.06	12.14	***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, n.s. = non-significant.

Table 5 Individual estimation by country

		U.S. (n = 105)		Spain (n = 181)		Czech Republic (n = 153)			
		Estimate	t	Estimate	t	Estimate	t		
H1	Visual appeal	→	Perceived fun	0.64	5.44***	0.39	4.56***	0.29	3.17**
H2	Escapism	→	Perceived fun	0.42	3.45***	0.53	5.71***	0.36	2.96**
H3	Perceived novelty	→	Perceived convenience	0.59	4.81***	0.87	7.63***	0.69	4.02***
H4	Economic value	→	Perceived convenience	0.15	1.44	0.19	2.83**	0.32	2.79**
H5	Perceived ease of use	→	Perceived fun	0.08	0.80	0.13	1.77	0.21	2.20*
H6	Perceived ease of use	→	Perceived convenience	0.43	3.68***	0.19	2.93**	0.10	1.13
H7	Perceived fun	→	Attitude toward mobile games	0.30	2.93**	0.24	3.58***	0.21	2.46*
H8	Perceived convenience	→	Attitude toward mobile games	0.64	4.86***	0.95	7.04***	0.90	4.32***
H9	Attitude toward mobile games	→	Intention to play	0.85	8.40***	0.73	6.85***	0.71	7.06***
		$\chi^2_{364} = 596.40$ ($p < 0.001$)		$\chi^2_{364} = 717.19$ ($p < 0.001$)		$\chi^2_{364} = 600.87$ ($p < 0.001$)			
		CFI = 0.87		CFI = 0.87		CFI = 0.87			
		ILI = 0.88		ILI = 0.87		ILI = 0.87			
		RMSEA = .081		RMSEA = .073		RMSEA = .065			

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Tests of Mediation

One of the problems in the use of structural equations modeling is that researchers tend to test a model in which “everything is related to everything” (Bagozzi and Dholakia, 2006). To avoid this problem, our study formally performed tests of mediation in which we did not postulate any direct path between the constructs. In so doing, we compared the baseline model ($\chi^2_{364} = 974.85$) to the model where a direct path was added. The difference in chi-square value was then calculated to determine whether mediation exists. This procedure has been considered essentially equivalent to that recommended by Baron and Kenny (1986) (Bagozzi and Dholakia, 2006). The results are shown in Table 6.

With regard to the first row, we tested a direct path from perceived ease of use to attitude toward mobile games. The difference between the baseline model and the modified model is -11.42 ($df = 1$), which is statistically significant at $p < 0.001$. Thus, we can conclude that perceived fun and perceived convenience only partially mediate the effects of perceived ease of use on attitude toward mobile games.

In the second row, a direct path was added from escapism to attitude toward mobile games. However, the difference in chi-square value was statistically nonsignificant ($\chi^2 = -0.34$, $df = 1$). Therefore, we may conclude that perceived fun mediates all effects of escapism on attitude toward mobile games. By the same token, in the test of the direct path from visual appeal to attitude toward mobile games, the difference in chi-square value was not significant, leading us to conclude that perceived fun mediates all effects of visual appeal on attitude toward mobile games.

Next, the direct path from economic value to attitude toward mobile games was tested and found to be nonsignificant. However, the direct path from perceived novelty to attitude toward mobile games produced a chi-square difference that was statistically significant ($\chi^2 = -16.45$, $df = 1$). Therefore, perceived convenience mediates

Table 6 Test of mediation

Model			χ^2	df	$\Delta\chi^2$	Δdf	p
Baseline model: $\chi^2_{364} = 974.85$							
Perceived ease of use	→	Attitude toward mobile games	963.45	363	-11.42	1	***
Escapism	→	Attitude toward mobile games	974.51	363	-0.34	1	n.a.
Visual appeal	→	Attitude toward mobile games	974.80	363	-0.05	1	n.a.
Economic value	→	Attitude toward mobile games	974.82	363	-0.03	1	n.a.
Perceived novelty	→	Attitude toward mobile games	958.40	363	-16.45	1	***
Perceived fun	→	Intention to play	959.65	363	-15.20	1	***
Perceived convenience	→	Intention to play	963.03	363	-11.82	1	***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

all of the effects of economic value on attitude toward mobile games but only partially mediates the effects of perceived novelty on attitude toward mobile games.

Furthermore, we tested two other paths drawn from perceived fun and perceived convenience to intention to play. In both paths, the difference in chi-square value is statistically significant. Thus, attitude toward mobile games only partially mediates the effects of perceived fun and perceived convenience on intention to play.

Tests of Latent Means

In RQ 1, we address a question as to whether our research model operates equivalently across the three countries. To this end, we performed a multigroup analysis, in which the parameters were specified as being invariant in both factor loadings and structural paths across the samples. Simultaneous estimation yielded a chi-square difference value of 68.86 with 56 degrees of freedom, which is statistically insignificant at $p < 0.05$. Thus, we can conclude that the causal structure related to our proposed model of mobile gaming adoption is equivalent across the three samples.

Next, RQ2 explores a question as to whether the strength of consumers' perceptions of the primary constructs of our model is similar across the countries. In so doing, we tested for differences in the latent mean structures across the three samples. Specifically, we performed three pair-wise comparisons. In each, the latent means of one sample were set to zero as a reference group, while we determined whether the differences in the factor means of the two groups are significantly different from each other in a relative sense.

Table 7 summarizes the latent mean structures between the American and Spanish samples. After we fixed the means of the American sample to zero (i.e. the reference group), the means of the Spanish sample turn out to be negative. As many as seven out of nine latent means are significantly greater in the American sample. No difference was found for perceived ease of use, escapism, and economic value. By the same token, Table 8 shows the results of the latent mean structure between the American and Czech samples. The majority of the latent means are statistically greater in the Czech sample, with the exception of visual appeal and escapism, which are more pronounced in the American sample. No statistically significant difference was produced in perceived fun and intention to play.

In a comparison of the latent means between the Spanish and Czech samples, Table 9 reveals some interesting results. In all but visual appeal and escapism, the latent means are greater in the Czech sample than in the Spanish sample. This may lead us to conclude that Czech consumers are more likely to perceive technology-based convenience, perceived ease of use, perceived novelty, and economic value as important determinants in adopting mobile games.

Discussion

In this study, we examined factors influencing mobile gaming adoption by youth in the U.S., Spain, and the Czech Republic. A research model based on TAM and the

Table 7 Comparison of latent means: U.S. versus Spain

Constructs	U.S.	Spain	<i>t</i>
Perceived fun	0	-0.67	-4.56***
Perceived convenience	0	-0.38	-2.24*
Perceived ease of use	0	-0.07	-0.61
Visual appeal	0	-0.99	-5.46***
Escapism	0	-0.26	-1.793
Perceived novelty	0	-0.48	-2.99**
Economic value	0	-0.31	-1.93
Attitude toward mobile games	0	-0.96	-5.41***
Intention to play	0	-0.75	-4.81***

Note: The latent means of the US sample are fixed to zero as reference values.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

experiential value scale was proposed and tested across countries. We obtained several important findings.

First, this study corroborates the widely accepted applicability of TAM to mobile devices (in particular, Bruner and Kumar, 2005), while perceived usefulness in the original model is replaced with perceived convenience. This modification was thought to be necessary because two studies on online gaming adoption (Ha et al., 2007; Hsu and Lu, 2004) find that perceived usefulness has little or no impact on attitude. Our findings suggest that perceived convenience, which represents the “it fits my life” as well as ubiquitous dimensions, had an important effect on attitude, thus proving that the modification improved the model’s predictive power in a mobile gaming context.

Still, it is surprising that perceived convenience exercises greater effects on attitude toward mobile games than perceived fun. This provides support for our proposition, in that it is probably the capability to be used efficiently at any time and in

Table 8 Comparison of latent means: U.S. versus Czech Republic

Constructs	U.S.	Czech Rep.	<i>t</i>
Perceived fun	0	0.07	0.60
Perceived convenience	0	0.44	3.13**
Perceived ease of use	0	0.87	5.18***
Visual appeal	0	-0.36	-2.34*
Escapism	0	-0.40	-3.01**
Perceived novelty	0	0.60	3.79***
Economic value	0	0.93	5.64***
Attitude toward mobile games	0	0.42	2.50*
Intention to play	0	0.03	0.17

Note: The latent means of the US sample are fixed to zero as reference values.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 9 Comparison of latent means: Spain versus Czech Republic

Constructs	Spain	Czech Rep.	<i>t</i>
Perceived fun	0	0.46	4.19***
Perceived convenience	0	0.47	3.40***
Perceived ease of use	0	0.48	4.21***
Visual appeal	0	0.10	0.69
Escapism	0	−0.04	−0.36
Perceived novelty	0	0.75	5.13***
Economic value	0	1.20	7.57***
Attitude toward mobile games	0	1.16	7.64***
Intention to play	0	0.60	3.99***

Note: The latent means of the Spanish sample are fixed to zero as reference values.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

any place (rather than mere usefulness) that is the most important determinant of mobile gaming adoption. It is very likely that consumers use this form of entertainment because it may help them to “kill time” or to find something to enjoy while not wanting to spend much energy in the search. This tendency is consistent across the countries. Undoubtedly, this is the perspective that differentiates mobile games from other technology-based services, such as the personal computer, Internet, or automated self-service machine. Taken together, our findings appear to suggest collectively that visual appeal, perceived ease of use, escapism, and especially perceived convenience are major factors shaping widespread acceptance of mobile phone games.

In addition, our mediation test detects that the direct path from perceived ease of use to attitude toward mobile games, which was not included in our model, is significant. This suggests that either perceived fun or perceived convenience only partially mediates the effects of perceived ease of use on attitude toward mobile games.¹ The same is true for the mediating role of attitude toward mobile games: It only partially mediates the effects of perceived fun and perceived convenience on intention to play. These findings add another example to the conflicting results in prior TAM research, in that the mediation of attitude is not always supported (Venkatesh and Davis, 2000). Specifically, our results contradict Bruner and Kumar (2005), who find the complete mediation of perceived ease of use and attitude, although both studies treat a similar research subject (i.e., mobile devices). The most logical explanation is probably that Bruner and Kumar’s (2005) study examines mobile Internet in general, while the current study examines mobile games. Thus, the usage context (commerce versus entertainment), the type of motivation (goal-directed versus hedonic), and the nature of behavior (deliberative versus spontaneous) in question may have affected the strength of mediation.

Second, unlike prior research on online games focusing on psychological motives, this study proposes the antecedents of perceived fun and perceived

convenience based on the experiential value scale. All of the constructs are empirically supported by our data. That is, the significant and positive effects are found between visual appeal and escapism and perceived fun, and between perceived novelty and economic value and perceived convenience. Escapism and visual appeals have almost equal levels of effects on perceived fun. Here, the effect of visual appeals is consistent with both Bruner and Kumar (2005) in a mobile Internet context (“visual orientation”) and Ha et al. (2007) in a mobile gaming context (“perceived attractiveness”). By contrast, perceived novelty exercises much greater effects on perceived convenience than economic value, leading us to conclude that its role is one of the most important among the antecedents. This suggests that, when playing, young consumers are very keen on the new features, functions, and modifications of mobile games.

Third, our proposed model receives consistent support from the U.S., Spain, and the Czech Republic. Our multigroup analysis demonstrates that the model operates invariantly across the countries, despite apparent differences in mobile gaming penetration. This may suggest the existence of common factors that influence mobile gaming adoption in these countries. If we accept the danger of oversimplification, our findings may provide evidence for the existence of a “world youth segment” in the U.S. and the European continent. It may be possible to assume that a somewhat homogeneous youth segment exists across borders. Such a segment seeks innovative technology that provides enjoyable and efficient pastimes, in which young consumers perceive a series of factors as important determinants in playing mobile games. This may be the result of the general proliferation of complex technology or functionality in products and services worldwide. Although complexity creates barriers to adoption, the continual development and introduction of consumer electronics since the 1990s, including the Internet and the mobile device, may have changed the general attitude toward technology adoption among consumers. This point deserves further exploration in future research.

Fourth, tests of latent mean structures reveal important differences in the perceived levels of constructs across the countries. On one hand, the differences between the U.S. and Spanish samples are striking in that the American samples are more likely to appreciate perceived fun, perceived convenience, visual appeal, and perceived novelty than their Spanish counterparts, thus formulating stronger attitudes toward and intention to play mobile games. This seems to reflect the differences in sales volume and penetration of the mobile device in the two countries. On the other hand, the same pattern is not observed either between the U.S. and Czech samples, or between the Spanish and Czech samples. In the former comparison, the latent means of perceived convenience, perceived ease of use, perceived novelty, and economic value are greater in the Czech Republic, while the contrary occurs in the latent means of visual appeals and escapism. In the latter comparison, seven out of 10 latent means are greater in the Czech Republic than in Spain. This may be because mobile games are relatively new in the Czech Republic, and this “booming” situation has led young consumers to perceive the constructs more strongly.

Limitations

To make our findings more objective, important limitations should be recognized. First, this study examined *both* offline and online mobile gamers because of the small sample size. Given the potential differences in online consumer behavior, the adoption models for online and offline gamers may differ. Second, the questionnaire items used in this study may have been too explicit. When answering the questions on a 7-point scale, the respondents may have thought of the best and the worst mobile games they have played. Third, no distinction was made in terms of the types of mobile games (embedded games, SMS games, and browser games) in the questionnaire, because our objective was to capture the general perceptions of the young consumers, even though their playing behavior may differ across these games. As a result, we should recognize that we cannot draw strong conclusions regarding the game-specific effects. Fourth, while the use of college students is justified and appropriate for this study, the student sample may reduce the external validity. Fifth, this study did not control for differences in gender and years of mobile phone usage across the countries. The finding concerning the Czech Republic's dimensions of perceived fun and perceived convenience may be most strongly related to the fact that the Czech samples are the most experienced mobile gamers. However, this is far beyond our scope, and future study should address this issue.

Finally, although the Asian countries are key players in this study, with high penetration of 3G-enabled mobile devices, none is included. It should be noted that data were indeed collected from Japan. However, because the multigroup analysis detected measurement invariance, the researchers decided not to include the Japanese dataset in the final analysis (please see Appendix B). This invariance may have been caused by inaccurate translation, which can be improved by multiple and simultaneous translation methods. Such practice will ensure that the semantic meaning of the questionnaire items is equivalent in all languages, thus minimizing the language-specific translation variance in the measurement preparation.

Conclusion

This study makes an important contribution to the consumer behavior literature, because it is one of the first attempts to explain mobile gaming adoption in a cross-country context. Despite increasing empirical research, there is a serious lack of studies that examine specific mobile service applications, while comparative exploration in mobile commerce research hardly exists. Our study serves as one of the pioneering attempts in this area.

The research model based on TAM and the experiential value scale is well supported and captures relevant antecedents of the attitude-intention chain. In particular, perceived convenience is found to be the strongest determinant of the attitude. This is important, because the lack of constraint in time and space (i.e., *ubiquity*) is one of the most unique aspects of the mobile device, and this has been included in

the perceived convenience construct. We strongly recommend an increased focus on these *ubiquitous* effects in future research.

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Note

- 1 One of the reviewers provided very insightful comments regarding the relationship between perceived ease of use and games. It is of course important to make a game easy enough to use so people are actually able to start using the game. However, it is also important not to make the game too easy to use, because it will then become boring. This probably explains why games often operate with “levels,” where the next level is a little harder to use or more challenging.

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Appendix A

Questionnaire items used in this study

1. Perceived fun (adapted from Mathwick et al. [2001]; Voss et al. [2003])
 - I find mobile games very entertaining.
 - The enthusiasm for mobile games is catching, and it picks me up.*
 - My cell phone doesn't just display games –it really entertains me.
 - I find the time I spend playing mobile games truly enjoyable, compared with other media.*
 - Playing mobile games is truly a joy.
2. Perceived convenience (adapted from Mathwick et al. [2001])
 - Playing mobile games is an efficient way to be entertained in any time, any place.
 - Playing mobile games makes my life easier.*
 - Playing mobile games fits in with the pace of my life.*
 - The mechanism associated with mobile games is truly functional.
 - I find mobile games very practical.
3. Perceived ease of use (adapted from Dholakia and Baggozi [2002])
 - It is easy to learn how to play mobile games.*
- I find it easy to play how to play mobile games.
 - I find it easy to play mobile games.
 - I often find mobile games difficult to play (reverse).*
 - To play mobile games you don't have to be technology expert.
 - The chances of experiencing technical failures in mobile games are relatively low.*
4. Visual appeal (adapted from Mathwick et al. [2001])
 - My cell phone displays games in an attractive way.
 - The games displayed in my mobile handset are aesthetically appealing.
 - I like the way games look on a mobile screen.*
 - I usually find the design of mobile games visually attractive.
 - Regardless of the type of fun they offer, mobile games usually use beautiful colours, graphics and layout.
5. Escapism (adapted from Mathwick et al. [2001]; Voss et al. [2003])
 - Playing mobile games gets me away from it all.*
 - Playing mobile games makes me feel that I am in another world.
 - When I play mobile games, I get so involved that I forget everything else.
 - While I play mobile games, I truly feel that I am escaping from reality.
 - In general, mobile gaming is a good way to change my mood.*
6. Perceived novelty (adapted from Dholakia and Baggozi [2002])
 - I like to experience novelty and change in my mobile routine.
 - I am willing to take risks when I use mobile games, because they are innovative.
 - Mobile games contain original ideas.
 - Mobile games are really stimulating.
7. Economic value (adapted from Mathwick et al. [2001])
 - Mobile games provide good economic value.*
 - Overall, I am happy with the cost of mobile games.

- Given the quality of the content, I find the costs of playing mobile games too high (reverse).*
 - The cost of mobile games is affordable and worthwhile.
 - The price I pay to play games on my mobile is usually reasonable.
8. Attitude toward mobile games (adapted from Hsu and Lu [2004]; Hung et al. [2003])
- I feel good about playing mobile games.
 - I like playing mobile games.*
 - Mobile games have many advantages.
 - Playing mobile games is a pleasant experience.
9. Intention to play (adapted from Hsu and Lu [2004]; Hung et al. [2003])
- I intend to play mobile games in the next week.
 - I intend to play mobile games in the next month.
 - I will play mobile games frequently in the future.
 - Using mobile games is worthwhile.*

*Items eliminated in the data purification process.

Appendix B

Individual estimation based on the Japanese data

			Japan (n = 165)		
			Estimate	<i>t</i>	
H1	Visual appeal	→ Perceived fun	0.62	4.34	***
H2	Escapism	→ Perceived fun	0.35	4.03	***
H3	Perceived novelty	→ Perceived convenience	0.22	2.11	,035
H4	Economic value	→ Perceived convenience	0.50	4.04	***
H5	Perceived ease of use	→ Perceived fun	0.23	2.72	,006
H6	Perceived ease of use	→ Perceived convenience	0.40	3.48	***
H7	Perceived fun	→ Attitude toward mobile games	0.58	4.83	***
H8	Perceived convenience	→ Attitude toward mobile games	0.42	3.73	***
H9	Attitude toward mobile games	→ Intention to play	0.45	5.12	***
			$\chi^2_{364} = 789.71$ ($p < 0.001$)		
			CFI = 0.85		
			ILI = 0.85		
			RMSEA = .080		

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.